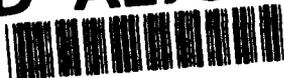


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Each major department of Walter Reed Army Medical Center was asked to develop a list of its top five priorities for the next eighteen to twenty-four months. Among those listed by the department of medicine and department of nursing was an intravenous/phlebotomy team. Various proposals were initiated by the proponent departments. This research consisted of a case study analysis using Patton's (1989) case study analysis method. The IV service coordinators of four local civilian hospitals were interviewed, and cases developed from these discussions. Teams at the case hospitals were composed of various mixes of registered nurses and technicians, with the scope of practice and duties varying from one facility to another. After analysis of cases developed for this research, it is my opinion that information gathered supports hiring the personnel necessary to staff an IV service at Walter Reed. The team should be composed of registered nurses and technicians and provide 24-hour coverage seven days per week.

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IMPLEMENTATION OF AN INTRAVENOUS/PHLEBOTOMY TEAM  
AT WALTER REED ARMY MEDICAL CENTER

A Graduate Management Project  
Submitted to the Faculty of  
Baylor University  
In Partial Fulfillment of the  
Requirements for the Degree  
of  
Master of Health Administration  
by  
Captain Steven D. Roth, MS, USA  
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## Abstract

As part of the strategic planning process, each major department of Walter Reed Army Medical Center (WRAMC) was asked to develop a list of its top five priorities for the next eighteen to twenty-four months. Among the priorities listed by both the department of medicine and the department of nursing was an intravenous (IV)/phlebotomy team. Proposals initiated by the proponent departments include (a) hiring employees required to form a team (b) contracting for a team, (c) hiring assistive personnel for the wards and not creating an IV team, or (d) maintaining the status quo. This research consisted of a case study analysis of the various proposals for the team. The method considered for the analysis was Patton's (1989) case study analysis. The IV service coordinators of four local civilian hospitals were interviewed, and cases developed from these discussions. IV teams at the case hospitals were composed of various mixes of registered nurses and technicians, with the scope of practice and duties varying from one facility to another. After analysis of cases developed for this research, it is my opinion that information gathered in the interviews and from the literature review supports hiring personnel to staff an IV service. The team should be composed of registered nurses and technicians and provide 24-hour coverage seven days a week.

## CHAPTER I: INTRODUCTION

### Conditions Which Prompted the Study

In response to Accreditation Council for Graduate Medical Education (ACGME) requirements for internal medicine, the department of medicine (DoM) at WRAMC has asked the department of nursing (DoN) to implement an IV/phlebotomy team. The standards which provided the impetus for this request became effective in October of 1989 and were re-emphasized in a memorandum from the American College of Physicians dated 5 July 1991. WRAMC is held to the standards, which state in part that "adequate clinical support services must be provided on a twenty-four hour basis, in sufficient number to meet reasonable and expected demands, including laboratory and radiologic...intravenous services, phlebotomy services, and messenger/transporter services" (ACGME, 1989).

According to Lieutenant Colonel (LTC) Donald Steinweg, Assistant Chief, Department of Medicine, (personal communication, 28 August 1992), a second reason for implementing this team is that it is considered by WRAMC's department of medicine to be the standard of practice among teaching hospitals in the Washington, D. C. metropolitan area. The final impetus suggested by LTC Steinweg is that implementation would greatly enhance morale and recruitment of residents for programs in internal medicine. After each medical rotation at WRAMC, medical students rate WRAMC in relation to their other training sites. The most persistent

complaint is that the ancillary support provided at WRAMC is substandard and that students are required to do too much "scut work". According to LTC Steinweg, not one Army student graduating from the Uniformed Services University of the Health Sciences (USUHS) applied to medicine for a residency in 1990. He suggests that the lack of ancillary support is a factor which contributed to the lack of applications from interns.

The purpose of the team would be to eliminate the need for physicians participating in training programs (house staff) to start IV's and perform phlebotomy, thereby allowing more time to concentrate on providing care to patients in high risk categories. Venous access is currently performed by medical students, physicians, and nursing personnel at WRAMC. This study will address multiple factors related to the implementation of an IV/Phlebotomy team. Among these are a) reduction of the burden on physicians and students involved in graduate medical education programs, b) readiness training for all military personnel assigned to WRAMC, and c) compliance with the requirements of the ACGME (which may be tied directly to readiness).

Lieutenant General (LTG) Alcide M. LaNoue's themes for his tenure as Surgeon General of the Army include readiness, teamwork, and customer focus. He is a firm believer in fiscal responsibility, and holds medical treatment facility (MTF) commanders responsible for the financial posture of their facilities. It is therefore in the best interest of the command

group at WRAMC to implement a proposal which satisfies the surgeon general's guidance while supporting cost containment efforts at WRAMC. The options summarized in the abstract have all been proposed by various staff elements within WRAMC. The research question was to determine which of the proposals would satisfy the conditions outlined above, specifically providing optimum IV and phlebotomy service to patients in the most cost-effective manner.

The need for an IV/phlebotomy team has been firmly stated by the leadership within the department of medicine, which is the primary proponent. The former Chief, Department of Nursing questioned the need for the additional support and proposed hiring "assistive personnel" to free nurses from performing non-nursing functions. Several facilities in the Baltimore area, which at one time had IV teams, have eliminated the teams for cost containment purposes. One facility disbanded its team as far back as 1972 (E. Streytle, personal communication, 21 September 1992). Some facilities in the Washington area have IV services in place, with some having existed for as long as thirty years. Most hospitals in both areas have maintained phlebotomy as a laboratory function. The purpose of this project was to determine the most beneficial manner by which the requirements of the ACGME and the desires of DoM and DoN can be met. Specific attention was paid to the areas of cost and readiness.

### Statement of the Management Problem

The management problem examined was the apparent lack of IV and phlebotomy support services available to house staff and nursing personnel. These support services may be essential for maintaining accreditation of graduate medical education programs. A shortfall in these support areas may result in less than full accreditation of some graduate medical education programs at Walter Reed. The availability of adequate support services is a contributing factor in attracting high quality residents to Walter Reed. The study addressed the situation which currently exists regarding IV and phlebotomy services at WRAMC. Two overarching questions were addressed. These were:

- (1) What are the options?
- (2) Which of the options will provide the most cost-effective service to patients and physicians?

### Review of the Literature

As previously mentioned, one of the areas on which this study concentrated was that of costs associated with IV therapy and phlebotomy. One of the costs of not having a team is the increased costs associated with complications from IV therapy and phlebotomy (Troxler, 1985). Scalley, Van, & Cochran (1992) conducted a study over a period of 30 months involving an IV team of 4.6 FTE's and its impact on IV-related phlebitis. A statistically significant ( $\underline{p}<0.05$ ) difference in the total rate of phlebitis, 8.8% vs. 11.8%, was identified. The authors cite a study by Cosentino (1978) which concluded improved results found with an IV team were due to strict adherence to aseptic technique, site selection, and proficiency of technique.

Maki (1992) and Widmer (1993) cite multiple studies which statistically measured the impact of a dedicated IV team on the rate of "catheter related septicemia" (p.880). The variables studied included type of catheter and care provider. Six of the studies showed statistically significant ( $\underline{p}<.001$ ) reductions in the incidence of septicemia when comparing house staff and ward nurses with the IV team. Two other studies which compared house staff with IV teams found statistically significant differences in the septicemia rates, one with  $\underline{p}<.02$  and the other with  $\underline{p}<.05$ . In these studies, the care provided by the IV teams was associated with the significantly lower rates of septicemia.

Mendez-Lang (1987) identified two categories of cost associated with phlebitis: a) costs associated with treating the phlebitis and b) costs associated with increased lengths of stay (LOS) due to phlebitis. Her study revealed a phlebitis rate of 3.4% in areas of the hospital serviced by the IV team and 31.8% in areas not serviced by the team. An area of concern with this study is the difference in sample size between the IV team and non-IV team groups. The size of the IV team sample was more than three times that of the non-IV team group (2,371 patients vs. 692 patients). Mendez-Lang estimated costs associated with treatment of phlebitis for the "typical 500-bed non-IV team hospital" (p. 352) to be \$203,950. Her estimate for a hospital with an IV team was \$22,535. The cost estimate for the increased LOS in the non-IV team hospital was \$226,619. These cost estimates were in 1987 dollars.

One of the key issues in development of an IV team is defining the scope of practice of the team. J. Heller (personal communication, 21 September 1992) stated that the team in place at her local community hospital is responsible for starting and maintaining all IV's during day and evening shifts. E. Streyle (personal communication, 21 September 1992) indicated that the venous access team in place in the urban teaching hospital with which he is affiliated is responsible for blood draws, blood cultures, and starting and restarting IV's. Both of the aforementioned hospitals are in the same state, thereby

responsible to the same licensing agencies. Ms. Heller stated the IV team which not only performs the actual venipuncture, but also monitors the IV sites and performs central line placement, makes the most significant contribution to a decrease in the rate of complications. However, the personnel trained to provide this level of care command a higher salary than those trained solely to perform venipuncture.

Medical operational readiness is a priority for the Army Medical Department (AMEDD). Nolan (1988) put forth the scenario of professional officer fillers deploying with a table of organization and equipment (TO&E) medical company on twenty-four hours notice. This Emergency Deployment Readiness Exercise (EDRE) was to determine whether the unit being evaluated could perform its wartime mission to minimum standards with the personnel and equipment it had on hand. The Joint Chiefs of Staff define readiness as "the ability of forces, units, ... to deliver the output for which they were designed" (Nolan, 1988, p. 527), in this case, patients who are able to return to duty.

One opportunity to maintain operational readiness is the medical readiness education and training exercise (MEDRETE). MEDRETE's are deployments of United States military medical teams outside the continental United States (OCONUS) in support of joint operations with allied nations (Hand, Wiener, & Sanford, 1989). One of the purposes of the MEDRETE's is to provide medical training to both U. S. and allied military personnel by having

them provide medical and surgical care to indigent personnel and military personnel of the allied nation (Wittich, 1989). The Mobile Medical Training Team of the Joint Medical Readiness Training Center (JMRTC), which is headquartered at the United States Army Medical Department Center and School, was involved in a MEDRETE in Kenya. One of the missions of the team was to provide sustainment training for senior medical NCO's. The primary goal was to reinforce the knowledge, skills, and abilities (KSA's) of the NCO's (Hand, et al., 1989). Were clinical personnel routinely sent on these missions, the same mission of reinforcing KSA's could be applied. Due in part to the medical specialties required for MEDRETE's, deployment of WRAMC clinical personnel on MEDRETES is not currently feasible. MEDRETES require mostly primary care physicians, not the subspecialists who comprise a significant portion of WRAMC staffing (Wittich, 1989). Deployment of personnel would also compromise the patient care mission of WRAMC. Another means must be found for physicians and nurses to maintain combat medical skills, of which IV therapy and phlebotomy are two, while adhering to residency guidelines and standards of nursing practice.

Anderson (1990) made the point that medical equipment and supplies hold little worth by themselves. Qualified health care personnel are required to operate the equipment and put the supplies to their intended use. A requirement exists for trained

physicians (and nurses) to staff rear echelon medical facilities in combat theaters. He suggested that current medical school criteria are not usually successful in providing the military with a physician well trained in casualty care techniques. Postgraduate medical training provided little experience in combat medical skills. The Air Force developed the Battlefield Medical Course for medical corps officers to correct this weakness. The military services later collaborated on the Combat Casualty Care Course (C4), a ten-day course open to officers of all military medical department branches. C4 is taught primarily in a field environment at Camp Bullis, Texas under the auspices of the JMRTC. The point to be made here is that a need exists for physicians and nurses to develop and maintain their combat medical skills, one of the most basic of which is gaining IV access. Fluid replacement and maintenance is often the deciding factor in the survivability of combat casualties. By taking the responsibility for IV starts, restarts, and maintenance away from physicians and nurses, we may be compromising the readiness of the AMEDD to perform its primary mission, that of caring for the combat casualty.

Hands-on training is of the utmost importance in maintaining hands-on skills. Parisi (1990) stated that personnel retain "about 23% of what they hear, 43% of what they see and hear, and 70% of what they see, hear, and do" (p. 214). It is evident, therefore, that for AMEDD personnel to maintain their proficiency

in critical wartime medical skills, these skills must remain a part of the soldier's peacetime medical practice.

Blanck, Butler, Connolly, McCarty, Williams, & Timboe (1986) stated firmly that the primary consideration in decisions which affect the military health service system is medical readiness. While the subject of the paper was medical corps readiness, Major General (MG) Ronald R. Blanck (personal communication, 11 December 1992) stated that this and other aspects of the paper could be extrapolated to all branches within the Army Medical Department (AMEDD). Peacetime medical care is a readiness issue, and Major General Blanck indicated that WRAMC is mostly a peacetime health care facility. Blanck, et al. (1986) state that after the size of the force has been determined, clinical proficiency is the basis for all medical readiness. The analogy is made that whereas the combat arms move, shoot, and communicate to successfully carry out their missions, the AMEDD moves, treats, and communicates to accomplish its mission. The professional competencies required of AMEDD officers to be both effective officers and practitioners can only be gained in peacetime, through continued practice in a high quality health care environment. This environment should not be limited to fixed facilities, but should also include practice in field settings. Certain training, such as that provided during a clinical practitioner's initial training, serves as the basis for clinical competence. A system must be in place to maintain the

level of medical readiness necessary to carry out the primary mission of the AMEDD, that being to provide health service support to soldiers in combat.

### Purpose

The purpose of this research project was to perform a case study analysis to determine the most beneficial method of providing the highest quality IV and phlebotomy services while factoring in monetary costs and combat medical readiness. The research examined alternative methods of providing IV service which meet the goals of maintaining readiness, which is a non-monetary cost, while keeping in mind the business environment in which Walter Reed Army Medical Center is currently operating. After analysis of the data gathered, recommendations were made on the most cost effective method of providing IV and phlebotomy service to the staff of WRAMC. Recommendations were also made to address the matter of maintaining the combat medical readiness of physicians and nurses.

## CHAPTER II: METHODS AND PROCEDURES

This study employed a case study methodology, using the opportunistic sampling strategy discussed by Patton (1990), to select the local hospitals which formed the information base. The intention was to select facilities with medical missions and patient mixes similar to those at WRAMC. The four hospitals which were used as cases for this study were University of Maryland Hospital, George Washington University Hospital, Washington Hospital Center, and Washington Adventist Hospital. With the exception of Washington Adventist Hospital, all the studied hospitals have graduate medical education missions. Washington Adventist was chosen for the length of time its IV therapy program has been in existence. Contacts were initiated at the four local hospitals, with preliminary research turning up a wealth of information. The primary technique used for data gathering was interviews with those personnel responsible for the operation of IV teams in each of these civilian hospitals.

Patton (1990) cites variations in interviewing. The most appropriate type of interview for this project was the informal conversational interview, which took advantage of the uniqueness of each facility. The interview questions, which are outlined below, were formulated by the researcher in conjunction with the chief of WRAMC's department of nursing. The interviews were not limited to the 17 structured questions. The final question allowed the persons being interviewed the opportunity to add any

helpful information not covered in the structured interview questions. The average time required to complete each interview was approximately one hour.

The structured questions which were asked of each coordinator were as follows:

1. How long has your IV service been in existence, and if you (or your facility) were making the implementation decision today, would the same decision arise?
2. What was the driving force behind the implementation of the IV service at your facility?
3. What are the duties and responsibilities of the IV service?
4. What are the hours of coverage for the service and what areas of the hospital are included?
5. How would you describe the scope of practice of the personnel working in the IV service?
6. Since the implementation of the IV service, has a trend been evident regarding the incidence of IV-related complications?
7. What measures are in place to insure the maintenance of IV skills for those nurses who are not members of the IV service?
8. How is the IV service staffed (i.e. all RN's, RN's and technicians, all technicians)?

9. Is IV support an issue when the residency review committees (RRC's) evaluate the graduate medical education (GME) programs (not asked at Washington Adventist)?

10. Does the IV service also provide phlebotomy service?

11. What are the salary ranges for IV service personnel?

12. What are the initial and continuing training requirements for IV service personnel?

13. Of those registered nurses working in the IV service, are any members of the reserve components of the armed forces? If so, are these people able to adequately maintain their IV skills?

14. How is the cost effectiveness of the IV service figured and justified?

15. Has any measure of physician and nurse satisfaction been obtained to compare levels before and after the implementation of the IV service?

16. Has patient satisfaction been evaluated before and after implementation?

17. What are the number of full time equivalents assigned to the IV service compared to the patient census, and what is the average number of IV's started daily?

Patton (1990, p. 99) stated that "the desire to evaluate individualized client outcomes...", which is the major objective

of this study, "...is one major reason why case studies may be conducted." The interviews were analyzed using cross-case analysis, which involves grouping answers from different people to the same question. A certain amount of case analysis was required to identify variations among respondents. The final case record has been organized topically.

The information gained through the completion of this study may prove useful to the staffs of other DoD medical treatment facilities (MTF's) which may be considering implementation of an IV team. It is important for facility commanders to consider the readiness mission of the AMEDD in making decisions. The ability of physicians and nurses to successfully start and maintain IV therapy in the combat environment was an important criterion in this study. Many civilian hospitals have already studied the issue of IV therapy and phlebotomy and made decisions based upon financial considerations. With the AMEDD shifting toward a more business-oriented approach to medical care, the information from this study may be useful to other military MTF's considering implementation of an IV and/or phlebotomy service. Due to the unique features of the military medical mission, the results of this study may not be able to be generalized to medical treatment facilities in the civilian sector.

### CHAPTER III: RESULTS

The current IV service at WRAMC consists of one Army Nurse Corps Lieutenant Colonel, who is available 0600-1530 Monday through Friday. This individual's functions include starting and restarting IV's and heparin locks, checking of IV sites only when requested, and placing (on a limited basis) peripherally inserted central (PIC) lines. Phlebotomy service is provided by the department of pathology Monday through Friday beginning at 0600 and lasting until the draws for that day are completed. LTC Steinweg states neither the scope of phlebotomy service nor that of the IV service currently provided meets the requirements of the ACGME. The interviewees and Colonel (COL) Karen Waxdahl (personal communication, 23 February 1993), infection control nurse at WRAMC, state that data are not maintained in a manner which lends itself to drawing statistical conclusions on the relationship of IV teams to the rate of IV-specific complications.

#### Case #1: University of Maryland Hospital, Baltimore, Maryland

The coordinator of the service at University of Maryland Hospital (UMH) is Mr. Edward Streyle. The program at UMH has been in existence since October of 1992, and was re-instituted after having been eliminated due to budgetary constraints. Since the venipuncture program was recently instituted, Mr. Streyle was unable to say whether or not the implementation decision would be the same. The driving force behind this team, which performs

only venipuncture, was the reluctance of the house staff to perform venipuncture for IV's and phlebotomy, especially during the evening and night shifts. He mentioned that implementation also took on a TQM focus of meeting the needs of certain customers, namely the house staff physicians. The team has not been in service long enough for its contributions to GME programs to be evaluated by residency review committees.

The technicians on the team are responsible solely for venipuncture, both for IV's and phlebotomy. Coverage is provided from 1900-0700 hours Monday through Friday, with no coverage on weekends or during weekdays. Ward nurses and house staff provide venipuncture service during the time frames not covered by the team. Coverage is only provided to department of medicine beds. Service is provided to 3 floors and 78 beds. The team does not service the ICU's. This is due to the fact that the FTE's and funding for the team came from the department of medicine. The only position to come from the department of nursing is that of the coordinator. It is too soon in the evolution of this team to draw any conclusions regarding complications and or satisfaction. Early data suggest that satisfaction among the nursing and medical staffs is high. No study has yet been conducted to measure the satisfaction of patients.

The salary for the technicians on the team is approximately \$19,000 per year. Didactic training is provided by the cancer center at UMH, with practical on the job training provided by the

phlebotomy service. Mr. Streyle stated that he does have nurses on his staff who are in the reserve component of the armed forces, and whose skills "probably suffer" in light of the team. However, there is no prohibition against nurses starting IV's, and likewise, no requirement for the venipuncture team to perform the procedure. The department of medical nursing justifies the cost of the team by the fact that the only cost to them is the supervisor. The annual expense is approximately \$70,000, and the team is seen as an excellent recruiting tool for house staff. The team consists of 2.4 FTE's for an average daily census of 110, and averages 40 venipunctures per night.

Case #2: George Washington University Hospital, Washington, DC

The IV therapy department at George Washington University Hospital (GWUH) has been in existence for seven years. The coordinator with whom I spoke is Karen Aguilo-Sierra. Ms. Sierra felt that the medical staff would certainly make the same implementation decision, while the department of nursing could "go either way". The impetus for the service was provided by the medical school and the department of medicine, for reasons similar to those at the other facilities. Duties and responsibilities include quality control, reduction of incidence of infection, observation and assessment of all sites, and providing a system of checks and follow-ups to insure the optimum in patient safety.

The team provides coverage to the entire hospital, with the exception of the ICU's and emergency room, 24 hours per day Monday through Thursday, 0730-2200 hours on Friday, and 0730-1600 hours on Saturday and Sunday. Coverage is provided to the coronary care unit as requested, not on a routine basis. The department of medicine would like to expand the hours of coverage to 24 hours, 7 days per week, but this can not occur until more FTE's become available. The scope of practice varies by unit, with the common practices being IV starts and restarts, dressing changes as needed, central line dressing changes every 72 hours, patient education, Leur lock caps, access and de-access of mediports, and Groshang catheters. The team performs some midline catheter placements, and is moving toward PIC placement. This team does not perform any infusions. The only data available on complications is for the previous six months, and indicated an average phlebitis rate of 4.63%, and 0-1% peripheral line infections. Ms. Sierra stated that the data collection method was suspect, thereby making the reported results suspect.

The IV team is composed of both registered nurses and technicians. Maintenance of skills for those nurses not on the team is "not a concern". However, opportunities for nurses not on the team to certify in IV therapy are provided. When the residency review committees examine the GME programs, the service provided by the IV team is considered adequate to support the GME programs. The IV therapy team does not perform phlebotomy. This

service is provided by the laboratory. The salary for the clinical nurses on the team is roughly \$16 per hour, and the technician salary is roughly \$8.54 per hour. All members of the team are required to pass initial training and annual refresher training, both of which are conducted by GWUH. The training program comprises those skills which are within the scope of practice of the IV team. All of the FTE's for the team were obtained from other areas within the hospital. Satisfaction among physicians, nurses, and patients was reported to be extremely high, as might be expected. The team consists of 6 RN FTE's and 3.8 technician FTE's, costing approximately \$267,180.

Case #3: Washington Hospital Center, Washington, DC

The coordinator for the IV service at the Washington Hospital Center (WHC) is Ms. Barbara Mills. Ms. Mills has been affiliated with the IV service since 1968, and states that the service has been in operation for a minimum of 25 years, possibly thirty. The team was originally part of the lab, and was later transferred to the pharmacy. Responsibility was then passed to the department of nursing, where it has remained. When asked if the decision to implement the team would be the same today, Ms. Mills stated emphatically that it would. She feels very strongly about the need for a designated group of individuals performing IV therapy to "increase proficiency". Ms. Mills was not entirely sure of the where the idea originated, but suggested that it was most likely with the physicians.

The IV service at WHC covers the entire hospital. The average daily patient census is 700 patients. The team is responsible for starts and restarts, heparin lock maintenance, hanging blood and blood products, straight line IV's, site assessment (daily rounds, evening & nights done by call or modified rounds), and some phlebotomy (mainly for plasmapheresis). This service does not perform routine phlebotomy. The laboratory is responsible for phlebotomy. Coverage has been 24 hours per day, seven days per week for greater than ten years. Statistics relating to trends in IV-related complications were not available, but Ms. Mills stated that she felt the trend has been toward fewer complications related to the IV's. The literature supports Ms. Mills position regarding the downward trend in IV-related complications.

The IV team at WHC is composed entirely of registered nurses, who must undergo initial certification and annual recertifications in skills required of IV team personnel. Each division within the hospital uses clinical nurse specialists to perform IV therapy training. The standards used are those national standards set forth by the Intravenous Nursing Society. The IV team nurses are used as a resource to maintain the skills of those RN's not on the team. Each nurse not part of the IV team is required to perform four supervised venipunctures annually, plus undergo didactic training. This is due to the fact that the team may not always be able to respond to a request

for service immediately, creating a situation in which the ward nurse would have to attend to the IV. IV therapy has not been an issue for the RRC's during their program reviews.

Most of the nurses on the IV team have more than one year of experience in IV therapy. These nurses are paid on a scale from \$16.32 per hour to \$27.18 per hour. With very limited exceptions, nurses applying for the IV team are required to already have at least one year of experience. All nurses new to the service start out with self-study and move on to a "buddy system". The training is tailored to meet the needs of the individual, with a 4-week minimum for those applicants with no experience. All applicants are tested at the end of the training period, with 80% being the passing score. All nurses on the team are encouraged to seek certification as Certified Registered Nurses Intravenous (CRNI's) and participate in continuing education programs. This certification initiative was not mentioned by any of the other coordinators interviewed.

WHC does not currently have any nurses on staff who are affiliated with the armed forces reserves. Cost effectiveness and justification for the IV service has not been scientifically figured. Ms. Mills justifies the team through decreased supply usage and complication rates. Again, this justification is supported by the literature and by COL Waxdahl (personal communication, 23 February 1993). The salaries for team members are said to "balance out" these factors. The medical and nursing

staffs see the team as taking away some of the "burden" as well as having IV care be "one less worry" for the ward nurses. The current medical director for the team, who has been in place for one year, is said to be highly satisfied. Patient satisfaction is also very high. The team is comprised of 21.4 FTE's and 3 prn (as needed) nurses from a pool. The average daily census is 700, with approximately 10,000 patient encounters per month. The average workday for one IV team nurse involves seeing 30-45 patients and performing 10-15 venipunctures.

Ms. Mills feels that the IV team increases productivity of the entire nursing staff. The trend in IV therapy is to increase interactions with chemotherapy patients and those on IV antibiotics. When considering implementation of a team, the comfort of the patients is an important consideration. Teams ensure experience, good technique, and monitoring of patients undergoing IV therapy. One must also look at the patient population and the demand for IV therapy.

Case #4: Washington Adventist Hospital, Takoma Park, Maryland

Ms. Violet Bennett is the coordinator for this service which has been in existence for over 35 years. She would definitely make the decision to implement the team if the decision were being made today. As with the other case hospitals, the medical staff was the driving force behind the IV service. The team performs tubing and dressing changes on the medical and surgical units. Blood draws are only made from ports and central lines.

This service does not perform midlines or PIC's. The medical and surgical units are covered seven days per week, twenty four hours per day with the following staffing: (a) 3-4 personnel on days, (b) 2 personnel on the evening shift, and (c) 1 person on nights. As with the other facilities, trends in complication rates have not been scientifically studied, but the observed pattern is for a lower complication rate.

All nurses at the hospital are required to go through annual recertification. Included in this process is knowledge of patient controlled analgesia (PCA) devices, CPR, safety, vital signs, operation of the glucascan, and for those nurses on the team, two supervised venipunctures using proper procedure. Nurses not on the team may be certified in venipuncture if they so desire. Recertification days are held quarterly.

The IV team is composed entirely of registered nurses. Ms. Bennett sees this as a question of responsibility and effected by the high volume of patients seen by the team. The team has 9.8 FTE's to cover an average census of 300 patients daily who are receiving IV therapy in some form. The team is justified by keeping infection rates as low as possible while providing optimum quality patient care. Having the IV team also requires less time of the floor nurses to deal with the various aspects of IV care. A comparison of the IV programs at the four case hospitals is at Table 1.

#### CHAPTER IV: DISCUSSION

It is evident from the information collected that the staffs of all four of the facilities which served as cases for this research are highly satisfied with their IV services. Two of those facilities have had IV services in place for 30 years or more. A third has recently implemented a venipuncture service after having had its IV team dissolved for budgetary reasons. As is the case at Walter Reed, the driving force behind the programs at all of the case hospitals was the medical staff, mostly for the reason of taking the "burden" of IV care off of the house and nursing staffs. One key issue which must be kept in mind when deciding what is right for WRAMC is the primary mission of AMEDD officers, which is to provide lifesaving care to combat casualties. An integral element of that care is IV therapy.

The duties and responsibilities of the teams are dependent upon the composition of the team. Those facilities with either a registered nurse/technician mix or all registered nurse team are able to provide true comprehensive IV therapy. The one facility which comprised its team of all technicians, while having a lower overhead cost associated with the team, only provides venipuncture service. By the same token, it is not the intention of that facility to provide comprehensive IV therapy, only to appease the medical house staff. The consensus among those interviewed is the team should provide coverage to the medical and surgical wards, and critical care units except for the

emergency room, on a 24-hour per day basis, seven days per week. The scope of practice is truly dependent upon the mission of the facility and the composition of the team. Those facilities providing IV therapy list starts and restarts, monitoring, dressing changes, and patient education as the staples of their programs. Phlebotomy services continue to be provided by the laboratory in all hospitals with a comprehensive IV service in place.

Both the literature and the interviews support a reduction in IV-related complications at facilities which have teams in place. This is important not only to patient satisfaction, but also to the facility's bottom line. By reducing complications, lengths of stay and supply consumption are also reduced. The composition of the team will drive the salary scale to be provided. Salaries must be competitive if a team is to be implemented and staffed with high caliber personnel available.

The hospitals which form the basis for this study provide a mechanism for nurses who are not part of the IV service to maintain their IV skills. It is imperative for WRAMC to require annual recertification in basic IV skills for all nurses and physicians. The nursing education office at WRAMC currently offers IV proficiency classes each Wednesday. This class is required only for those nursing personnel starting work at WRAMC. Annual certification is not currently required at WRAMC. Implementation of the IV team will eliminate the repetition

necessary to maintain these skills, which are cornerstones of combat medical readiness, thereby making necessary annual recertification. Responsibility for this recertification should remain with the nursing education office.

Estimates for FTE's were developed from information provided by WRAMC's department of nursing in addition to results from the interviews. The department of nursing provided FTE estimates from which the total annual hours of work required were derived. The hours available for one FTE were defined as the hours available from one full time budgeted employee less annual leave, sick leave, holiday time off, and lost patient care time due to training. Actual calculations are found in Table 2.

Salary computations were made as follows, to facilitate comparison. First, the salaries of RN's and technicians at the case hospitals were averaged, providing an average annual salary. Next, military salaries were computed using the figures for an O-4 over twelve years of service and an E-4 over four years of service. These salaries were then used in the computation of cost per bed. The estimated annual salary cost to WRAMC is based upon civilian RN staffing and military technician staffing. The estimated annual cost to WRAMC if the IV team is implemented is approximately 310,220. This is based upon 8.3 registered nurse FTE's and 2.3 technician FTE's (see Table 2). Mendez-Lang's (1987) total cost estimate for treatment of IV-related complications and increased length of stay due to those

complications was \$430,569 (1987 dollars). This cost figure is defined as the "cost of treatment of phlebitis ... and the cost of increased length of stay (LOS) due to phlebitis" (p.349). Those elements which make up these costs are costs for material, direct labor, indirect labor, analgesia, culture and sensitivity tests, carpal tunnel release, and dressings. It is apparent that implementation of an IV team at WRAMC should result in significant overall cost savings. The literature supports a complication rate of twenty-five to thirty percent before the implementation of a team. The residual rate of complications following implementation averages five percent. This five percent rate is the anticipated residual complication rate for WRAMC.

## CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS

I conclude that, to benefit both the patient and the institution, Walter Reed Army Medical Center should implement an IV team, while leaving responsibility for routine phlebotomy within the Department of Pathology. The literature and persons interviewed support an increase in the quality of care provided, and a decrease in the monetary costs associated with patient care. These cost savings result from the reduced supply and personnel costs associated with the decrease in the rate of infections and complications.

My recommendations for the design of this team are as follows:

1. In keeping with the business operating environment, the team should be comprised of a combination of registered nurses and technicians. Funding for the team should come from the various departments within the hospital. This is consistent with those case study facilities which have teams for which the impetus was from the department of medicine.

2. The scope of practice should include starts and restarts of peripheral IV's, monitoring of sites, routine dressing changes and site care, mid-line placement, placement of peripherally inserted central catheters, heparin locks, and patient education.

3. The team should provide coverage on a 24-hour, seven day per week basis. This study has shown that IV therapy

provided by a trained team results in lower rates of related complications than that provided by house staff and ward nurses. Team members are generally more proficient in aseptic technique, site selection, and site monitoring. These skills are paramount to reducing IV-related complications. Patients receiving IV therapy during non-normal duty hours are no less deserving of high quality care than those receiving therapy during normal duty hours.

4. A program for annual recertification of IV therapy skills practiced by the team skills is essential to the successful operation of the IV team. Materials required for recertification are currently available in the department of nursing education and staff development at WRAMC. The personnel and space required for this training are already in place. The costs for the recertification are those associated with the IV team staff being in training and not performing the patient care mission. The responsibility for annual recertification requirements should rest with the department of nursing.

5. All Army Nurse Corps and Medical Corps officers assigned to WRAMC should be required to undergo annual recertification of basic IV skills, not necessarily all of those skills performed by the IV team. Again, this training program is already established and in operation. This training is necessary to maintain the skills of these nurses and physicians who may be called upon to perform duties in a combat area with short notice.

It is essential to keep in mind the primary mission of the AMEDD when implementing this team, which is combat medical readiness.

6. The IV service should be composed of 8.3 registered nurse FTE's and 2.4 technician FTE's. The number of FTE's required was developed using documentation provided by WRAMC's department of nursing in addition to results from the interviews. Salaries should be developed utilizing the provisions of Title 38 and a market survey to determine the local standard.

WRAMC, as a hospital with many GME programs, must provide the optimum in both medical education and patient care. The standard for large academic medical centers within the Washington/Baltimore area is to have an IV team, or at the least a venipuncture team, in place to assist the clinical staffs with providing the highest quality, most cost-effective health care possible. From this standpoint, WRAMC is below the standard in this area. The time has come for Walter Reed to parallel itself with the local standard of IV care in this area.

CHAPTER VI: REFERENCES

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	UM	GWU	WHC	WAH
	=====			
TIME IN SVC (YRS)	4 MONTHS	7 YRS	25-30 YRS	>35
COMPOSITION	TECH	TECH/RN	RN	RN
# OF FTE'S	2.4	3.8T/6RN	21.4	9.8
AVG ANN SAL	\$18990	\$17763/33280	\$33945	\$32822
# OF BEDS SVD	78	350	850	310
AVG COST/BED	\$584	\$193/571	\$855	\$1038
SVCS PROVIDED	START/ RESTART PHLEBOT	START/ RESTART DRESS CHG MEDIPOINTS PT EDUC MIDLINE PLC PIC (LATER) LEURLOCKCAP	START/ RESTART HEP LOCK HANG BLD & PRODUCTS STR LINE IV SITE ASSESS	START/ RESTART TUBE CHANGE DRESS CHG
HRS OF COVERAGE	1900-0700 M-F	24-HR M-TH 0700-2200 FR 0700-1600 S/S MAY EXPAND LATER	24-HR 7 DAYS/WK	24-HR 7 DAYS/WK

KEY TO ABBREVIATIONS

UM = UNIVERSITY OF MARYLAND HOSPITAL  
 GWU = GEORGE WASHINGTON UNIVERSITY HOSPITAL  
 WHC = WASHINGTON HOSPITAL CENTER  
 WAH = WASHINGTON ADVENTIST HOSPITAL

TABLE 1. PROGRAM COMPARISON

	DAY	EVENING	NIGHT	W/DAY	W/EVEN	W/NIGHT
RN	3	2	1	1	1	1
TECH	1	2	1	1	1	1

Care hours required : FOR RN:  $\frac{15808}{1912} = 8.3$  FTE's  
hours worked/FTE :

FOR TECHS:  $\frac{4576}{1912} = 2.3$  FTE's

TOTCOSTS:	RN COST/YR	TECH COST/YR
# FTE'S	8.3	2.3
SALARY	\$276,741.92	\$33,478.80

ANNUAL SALARY COST: \$310,220.42

AVERAGE COST PER BED: RN = 438.58  
 TECHNICIAN = 53.06

TABLE 2. FTE AND SALARY PROJECTIONS FOR WRAMC